LORAIN

POWER EQUIPMENT

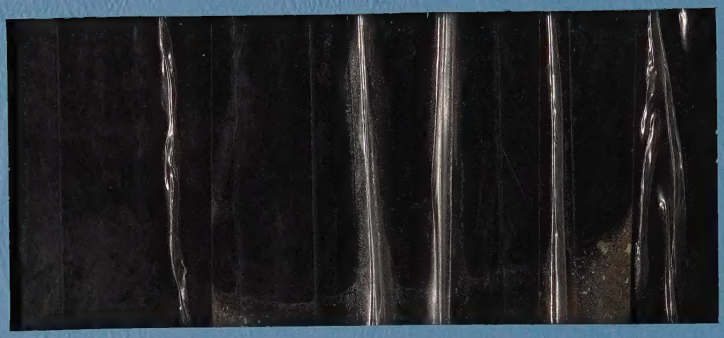
INSTRUCTIONS

INSTALLATION

OPERATION

MAINTENANCE

RELIANCE COMM/TEC



LORAIN ® MODEL A25F50

FLOTROL ® RECTIFIER

SPEC. NO. 5411-055-00 SERIAL NO. 3760

RELIANCE COMM/TEC CORP., LORAIN PRODUCTS DIVISION
A RELIANCE ELECTRIC CO.

WARRANTY

Seller warrants that the products it manufactures or sells shall be free from defects in material and workmanship during the first 90 days after the product is activated. During said period, Seller will repair or replace any defective parts free of charge to Buyer, including any labor costs. In addition, Seller shall repair or replace any defective parts, so discovered by Buyer to be defective within two years from the date of shipment of same, provided Buyer promptly so notifies Seller. In no case shall Seller's liability under this warranty extend beyond two years from the date of shipment of said product. This warranty shall not apply to any products which are misused, modified, repaired, or otherwise abused by Buyer or others. The repair or replacement of defective parts, or the refund of the invoice cost thereof, as shall be determined by Seller in its sole discretion, shall be the limit of Seller's liability hereunder and shall be Buyer's sole and exclusive remedy.

Handling or service charges in connection with the return of such products, if approved by Seller, shall be charged as determined by Seller. Seller shall not be liable in any event for any general or special, incidental or consequential damages to Buyer in excess of the amount of the purchase price of the products.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES. SELLER MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE WITH RESPECT TO ANY PRODUCTS EXCEPT AS HEREIN EXPRESSLY PROVIDED.

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In the event that the product involved is a system or equipment which, in the judgement of Lorain Products, is not economically returnable to the factory or if Lorain Products has performed the installation, supervised the installation, or performed testing and turn-on, circuit components and Lorain repair labor are covered by this warranty for the first 90 days from date of turn-on and circuit components are warranted for two years from the date of shipment. Upon request, Lorain will send a service technician to the site to determine if the unit is defective in circuit components or workmanship, and will repair the equipment. If the failure is Lorain's fault, no invoice for circuit components or repair labor will be issued if the complaint has been issued within the first 90 days from date of turn-on. If the complaint is issued more than 90 days from the date of turn-on but within two years from date of shipment, the customer will be billed at the prevailing Customer Service rates but will not be billed for circuit components. If the problem occurs after two years from the date of shipment, circuit component and repair labor are billable.

If the problem has been created by misuse or abuse of the equipment or by malfunction of associated equipment or by environmental conditions, at any time after shipment, the customer will be billed for circuit component and labor.

GENERAL PROVISIONS

Lorain Products shall not be obligated to pay any costs or charges incurred by the customer or by any other party. In no event will Lorain Products be liable for consequential damages. No waiver, alteration or modification of any of the provisions herein shall be binding on Lorain Products unless in writing and signed by an authorized official of Lorain Products. If, during any warranty period, the subject equipment has, in the opinion of Lorain Products, been modified or misrepaired, the warranty will be void unless the modifications or repairs have been made after consultation with Lorain Products and upon the recommendation of Lorain Products.

LORAIN® MODEL A25F50 FLOTROL® RECTIFIER SPEC. NO. 5411-055-00 SPEC. NO. 5411-058-00

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APPENDIX

1. DESCRIPTION

General

1.01 This rectifier operates from nominal 120/208/240 VAC, 47 to 63 Hz input to maintain a 23 or 24 cell battery in a fully charged condition while powering a load, and is listed by Underwriters' Laboratories Inc. under Standard 1012 for power conversion equipment in a controlled environment. The rectifier may also be operated as a battery eliminator. This rectifier is a compact unit which uses high frequency switching circuitry to reduce the volume and weight of the rectifier.

1.02 Float Charging: Rectifier output current remains equal to load current as long as load current does not exceed a predetermined value. This mode of operation is known as float charging. During normal operation, the battery does not furnish load current, and remains in a fully charged condition.

1.03 Equalize Charging: If higher DC voltage is required for equalizing the charge on all battery cells or for recharging the battery following a commercial power failure, equalize charge operation can be controlled locally at the rectifier, or from a remote location, if desired.

1.04 Current Limiting: When an AC power failure causes battery discharge, or in event of DC overload, an output current limiting circuit prevents the increase of output current above a predetermined value.

1.05 Paralleling: The DC output from this rectifier may be connected in parallel with the output of any other LORAIN Model A25F50 FLOTROL Rectifier of the same output polarity. Paralleled rectifiers have an internal circuit to enhance load sharing.

1.06 Selective Overvoltage Shutdown: A circuit is provided for load protection which enables the rectifier to shutdown should its output voltage exceed a preset value. If several rectifiers are operated in parallel, only the rectifier with the overvoltage condition will shutdown.

1.07 Rectifier Low Current Test Feature: This rectifier is equipped with a test circuit which will assure that the rectifier, while operating at no load, is capable of

delivering load current. When the rectifier is operating at no load, the test circuit will automatically periodically check the Power Converters ability to deliver power to the load. If the rectifier is incapable of delivering output current during the test cycle, the rectifier fail alarm (RFA) will be activated.

2. INSTALLATION

General

2.01 Equipment placement at the installation site should be given consideration as discussed in the following paragraphs.

2.02 Mounting: This rectifier is designed for 19 inch relay rack mounting. Reversible mounting angles permit mounting of the rectifier in a 23 inch relay rack. Accessory adapter plates are available to mount Spec. No. 5411-058-00 in a 26 inch relay rack. Refer to the Power Data (PD) Sheet for further information.

2.03 Ventilation Requirements: Two rectifiers can be mounted with no spacing between the units if temperature of the air entering the cabinet does not exceed + 50°C (+ 122°F). More than two units require a 3-1/2 inch baffle plate between the pair of rectifiers and other heat producing equipment.

Electrical Connections

2.04 Wiring: All wiring and branch circuit protection should follow provisions of the current edition of the National Electrical Code. Referenced to the 1984 edition for specific requirements are:

Article 240-6 Branch Circuit Rating

Table 310-16 (75°C) Ampacity of Power Conductors

WARNING

Do not make any connections with power applied to the rectifier.

2.05 General: To gain access to the input and output terminations, alarm-control terminal block TB4, and voltage tap adjustment terminal blocks TB1 and TB2, loosen the two fasteners on the front cabinet door and pivot the door downward on its hinge.

2.06 Input Connections: All input connections are made to terminals LINE and LINE/NEUT on the AC Input terminal block. Perform the AC input connections as described in the following procedure. Refer to Figures 2-1 and 2-2 for details.

a) 120 VAC Input

1) Connect the neutral lead to terminal block LINE/NEUT adjacent to AC INPUT circuit breaker CB1.

2) Connect the line 1 input lead to the terminal labeled LINE on the AC Input terminals.

b) 208/240 VAC Input

1) Connect the line 1 input lead to the terminal labeled LINE on the AC Input terminal block TB1.

2) Connect the line 2 input lead to the terminal labeled LINE/NEUT on the AC input terminals.

2.07 Perform the necessary tap adjustments to TB1 and TB2 for the desired AC input voltage used by the customer. Refer to Table 2-1 for proper tap connections.

Nominal Input Voltage	Connections to TB1	Connections to TB2
120	TB1-1 to TB1-2 and TB1-2 to TB1-4	TB2-1 to TB2-2 to TB2-4 and TB2-3 to TB2-5
208/240	TB1-2 to TB1-3	TB2-3 to TB2-4

Table 2-1

2.08 Output Connections: Connect DC output leads to DC OUTPUT terminals + (positive) and - (negative).

2.09 Earth Ground Connection: A frame ground lug (FR GND) located near the AC INPUT circuit breaker must be connected to an earth ground. Do not connect to power system neutral.

2.10 Remote Equalize: Customer furnished + 48V (ground) applied to TB4 terminal 1 places the rectifier into equalize charge operation. When remote equalize control is utilized, the front panel FLOAT/EQ rocker switch must be in the FLOAT position.

2.11 Rectifier Fail Alarm: During normal rectifier operation, open loop circuits will be provided between TB4 terminals 2 to 3 and closed circuits will be provided

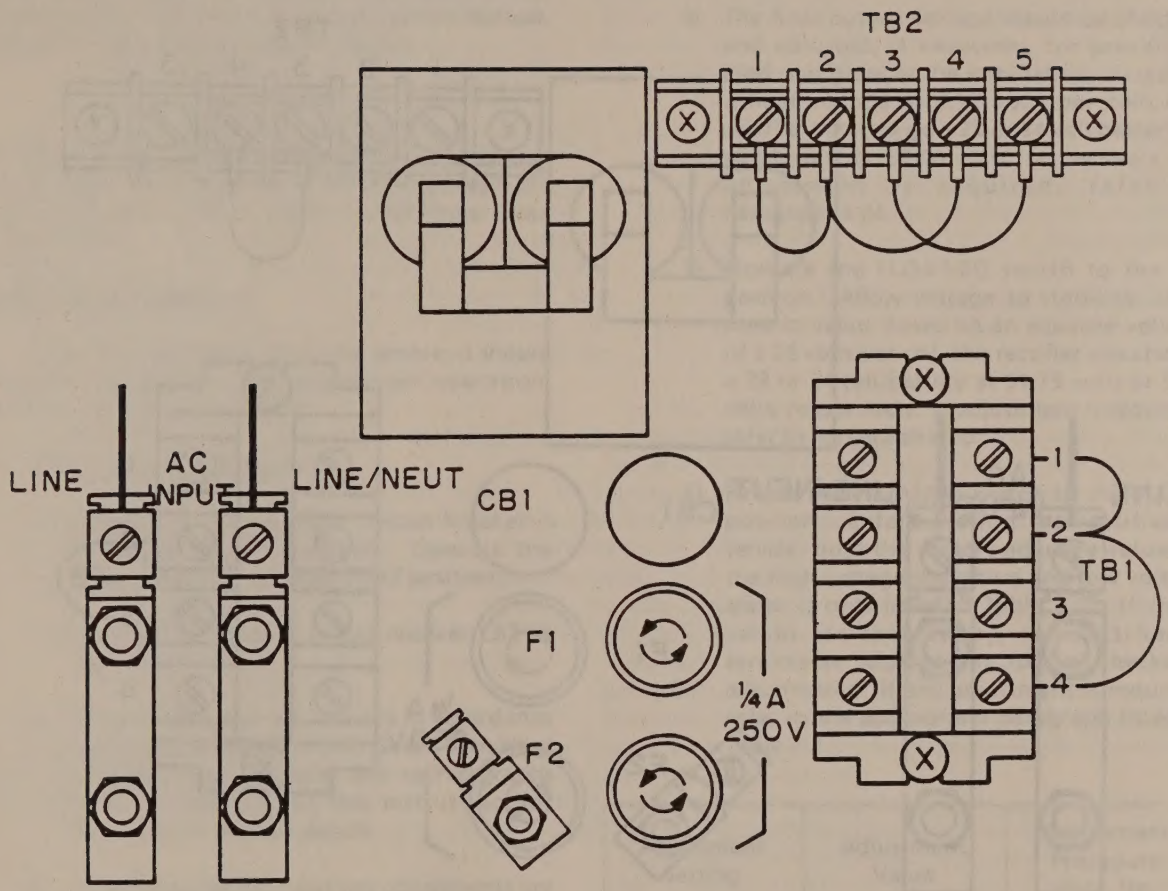

FIGURE 2-1
120 VAC INPUT

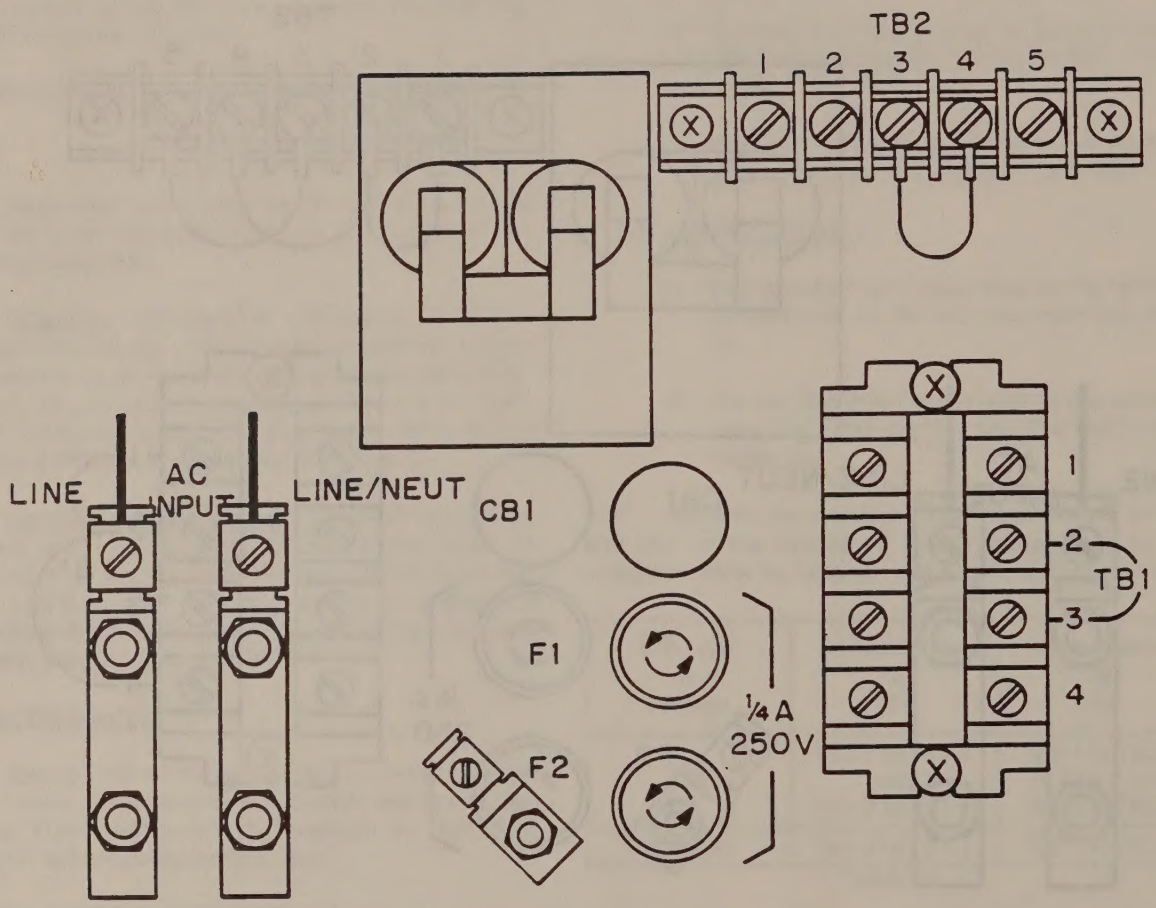

FIGURE 2-2
208/240 VAC INPUT

between TB4 terminals 3 to 4. During a rectifier failure condition, circuits will open between TB4 terminals 3 to 4 and circuits will closed between TB4 terminals 2 to 3. A list of failures which will actuate the rectifier fail alarm are given in the operation section of this manual, or refer to the Power Data Sheet for details.

NOTE

If ground actuated external alarms are desired, connect a jumper from TB4 terminal 3 to the appropriate rectifier fail alarm contacts. Refer to the Power Data Sheet for details.

Initial Startup and Checkout

2.12 When placing the rectifier into service, it should be adjusted and checked to insure proper operation. Observe the following procedure:

a) Initial Startup Preparation

1) Insure that the AC INPUT circuit breaker is placed to the OFF position. Operate the FLOAT/EQ switch to the FLOAT position.

2) Place the DC output circuit breaker CB2 to the OFF position.

3) Make all installer connections in accordance with the Power Data (PD) Sheet furnished with this manual. Refer also to Paragraphs 2.04 through 2.12 of this instruction for electrical connection details.

4) Insure that the AC Input tap adjustments are correct for the prevailing AC input voltage. Refer to Paragraph 2.07 of this instruction for voltage tap adjustments.

b) Rectifier Startup and Checkout

1) Apply AC input power by closing the external AC distribution fuse or circuit breaker, then operating the AC INPUT circuit breaker on the rectifier to the ON position. The rectifier should start.

2) Place the DC output circuit breaker CB2 to the ON position. The output voltage should be within the range of 48.3 to 55.2 volts.

3) The current limit point may be checked if desired by applying slightly more than full load to the rectifier output. This rectifier is designed to limit current within a range of 100% to 115% of rated full load.

4) The float output voltage should be checked and adjusted, if necessary, for prevailing load conditions at the installation. Based on a float voltage of 2.17 volts per cell, this rectifier can charge a 23 or 24-cell battery at 49.91 volts or 52.08 volts, respectively. If adjustment is required, refer to Paragraph 4.04.

5) Operate the FLOAT/EQ switch to the EQ position. Allow voltage to stabilize, then note its value. Based on an equalize voltage of 2.25 volts per cell, this rectifier can charge a 23 or 24-cell battery at 51.75 volts or 54.0 volts, respectively. If adjustment is required, refer to Paragraph 4.05.

6) Return the FLOAT/EQ switch to the FLOAT position. Before placing the rectifier in service, note the factory-adjusted values of the high voltage shutdown and low voltage alarm circuits listed in Table 2-2. If these values are satisfactory, the rectifier is serviceable without any further checks or adjustments. If any adjustment is required, refer to the appropriate paragraph listed in Table 2-2.

Adjustment Setting	Adjustment Value	Adjustment Procedure Para. No.
Low Voltage Alarm	47.1V	4.07
High Voltage Alarm	57.6V	4.08
High Voltage Shutdown	59.0V	4.09

Table 2-2. Factory Adjustment Value

3. OPERATION

Starting and Stopping

3.01 This rectifier is started or stopped by operating the AC INPUT circuit breaker to the ON or OFF position. The circuit breaker is accessible through a cutout on the front panel. If the circuit breaker remains in the ON

position following commercial AC power failure, the rectifier starts automatically when power is restored.

Controls and Indicators

3.02 The following switches and light emitting diodes, control the operation and indicate the status of the rectifier.

AC INPUT Circuit Breaker (CB1): This circuit breaker connects or disconnects AC input power to the rectifier circuits.

DC OUTPUT Circuit Breaker (CB2): This circuit breaker connects or disconnects DC output power to the load.

FLOAT/EQ Switch: When this switch is in the FLOAT position, sufficient voltage is provided to maintain the battery in a fully charged condition and at the same time supply load demands. When placed in the EQ position, the rectifier output voltage is increased to equalize the charge of all battery cells.

POWER ON Indicator: Illuminates when AC input voltage is present and the AC INPUT circuit breaker is in the ON position.

EQ Indicator: Illuminates when the rectifier is supplying equalize charge voltage.

HVA (High Voltage Alarm) Indicator: This indicator illuminates to indicate that output voltage of the rectifier has risen above a predetermined adjustable level.

RFA (Rectifier Fail Alarm) Indicator: This indicator illuminates to indicate that a failure has occurred which has disabled the rectifier. In addition to the RFA indicator being illuminated, relay contacts are available for connection of external rectifier fail alarms, if desired. Refer to Paragraph 3.08 for a list of failures which will result in a rectifier fail alarm.

LVA (Low Voltage Alarm) Indicator: Illuminates when the output voltage drops below the factory setting of 47.1 VDC.

TP1 and TP2 Test Points: Insulated test points, connected across the DC output and located on the front door, are provided as a convenient method for connection of an external high impedance DC voltmeter.

Metering

3.03 A DC ammeter designated OUTPUT CURRENT indicates rectifier output current.

Float Charging

3.04 Under normal operating conditions, the FLOAT/EQ switch on the rectifier front panel is set to the FLOAT position. Float output voltage from the rectifier is sufficient to power the DC load while maintaining the charge on the battery; therefore, the battery normally does not supply load current. If load current exceeds the full load rating of the rectifier, the battery supplies the difference in current as long as the overload is sustained.

Equalize Charging

3.05 Higher charging voltage is required at times to equalize the charge on all battery cells or recharge the battery in a minimum amount of time following a discharge period. Setting the FLOAT/EQ switch to the EQ position provides output voltage slightly higher than float voltage.

WARNING

Do not supply equalize voltage for a longer period than necessary. Prolonged higher charge voltage will overcharge the cells and reduce battery life.

High Voltage Shutdown

3.06 If rectifier output voltage exceeds a preset high voltage limit, the power conversion circuitry will be inhibited causing the rectifier to shutdown and lockout. To restart the rectifier after a high voltage shutdown, operate the AC INPUT circuit breaker to the ON position. The rectifier should restart.

3.07 This rectifier contains a circuit which permits selective overvoltage shutdown when two or more rectifiers are operated in parallel. The circuit allows operation of the overvoltage shutdown circuit only in the rectifier causing the overvoltage condition. If the rectifier is delivering less than 0.3% of rated load during parallel operation, the shutdown value is increased 4.5% above the preset high voltage shutdown level.

Rectifier Fail Alarm

3.08 If a failure disables the rectifier, a local RFA indicator illuminates and relay contacts are made available for connection of external alarms, if desired. Malfunctions which will cause the rectifier fail alarm circuitry to be activated include:

a) Complete failure of AC input voltage.

b) AC INPUT circuit breaker turned off either manually or automatically. (Excessive input current or a high output voltage condition will cause the AC input circuit breaker CB1 to shut off automatically).

c) Rectifier output voltage decreases below the low voltage alarm (LVA) setting.

d) Inability of the rectifier to deliver power to the load.

e) Opening of the output circuit breaker CB2 either manually or automatically. (Excessive output current to the load will trip the output circuit breaker CB2).

f) Rectifier output voltage exceeds the high voltage shutdown setting.

g) Rectifier output voltage increases above the high voltage alarm (HVA) setting.

h) Opening of control fuses F1 and F2.

Fuses

3.09 Two fuses F1 and F2 are located on the inner panel behind the front access door. If replacement of these fuses becomes necessary, use only Bussmann MDL.25 LORAIN Part No. 2484-212-00 or equivalent.

4. ADJUSTMENTS

Introduction

4.01 Various control potentiometers and tap adjustment terminals are present throughout the recti-fier. Adjustment procedures appearing in this portion of the instructions are those which may be required during the serviceable life of the rectifier. All controls were set for proper equipment operation at the time of manufacture, and periodic readjustment is not normally required. If adjustment does become necessary, only the adjustment procedures presented in these instructions should be performed. Do not attempt to perform any adjustments not described in these instructions. Disturbing the settings of any factory-adjusted controls which are not intended for user adjustment can result in degraded equipment performance. The test equipment required for performing adjustments is listed as follows:

a) Digital Multimeter: Fluke Model 8022A, or equivalent.

b) Alignment Tool: Insulated screwdriver tool, General Cement Type GC8728A, or equivalent.

c) Adjustable Test Load: Variable resistive load, rated for at least 30 amperes at 52 VDC.

DANGER

Some of the following adjustment procedures are performed with power applied. This rectifier operates from AC voltage capable of producing fatal electrical shock. Servicing personnel must observe all safety precautions normally associated with maintenance or adjustment of electronic equipment, and must avoid direct contact with any energized electrical termination. This rectifier produces high DC output current; therefore, servicing personnel must remove watches, rings, or other jewelry before making test equipment connections or performing internal adjustments.

Float Voltage Adjustment

4.04 Potentiometer FLOAT, located on Control Printed Circuit Card A4, is accessible through the front panel of the rectifier. Unless otherwise specified, the float voltage has been factory adjusted to 52.08 VDC (24 cells at 2.17 V/cell). The potentiometer setting, if changed, should be done in small increments. Before adjustments are made, verify that the battery is fully charged.

a) To obtain float output voltage, place the FLOAT/EQ switch in the FLOAT position.

b) To increase float voltage, adjust potentiometer FLOAT slowly clockwise. To decrease float voltage, adjust potentiometer slowly counter-clockwise.

c) When the setting of the FLOAT potentiometer has been changed, allow battery voltage to

stabilize at its new value, then note whether this value is as desired.

d) Repeat Steps b) and c) as necessary to obtain the required float voltage.

Equalize Voltage Adjustment

4.05 Potentiometer EQ, located on Control Printed Circuit Card A1, is accessible through the front panel of the rectifier. This potentiometer sets the value of voltage supplied to equalize charge the battery. Unless otherwise specified, the equalize voltage has been factory adjusted to 54.0 VDC (24 cells at 2.25 V/cell). The potentiometer setting, if changed, should be done in small increments. Before performing this adjustment, insure that the rectifier is not operating in the current limit mode.

a) To obtain equalize output voltage, place the FLOAT/EQ switch in the EQ position.

b) Allow DC output voltage to stabilize at its new value.

c) To increase equalize voltage, adjust potentiometer EQ clockwise. To decrease, adjust potentiometer counterclockwise.

d) Repeat Steps b) and c) as necessary to obtain required equalize voltage.

Low Voltage Alarm Adjustment

4.07 The low voltage alarm adjustment potentiometer R54, located on the control card A4, sets the value at which the LVA (Low Voltage Alarm) LED illuminates to indicate a low voltage condition on the output of the rectifier. Note the RFA rectifier fail alarm LED also illuminates. Unless otherwise specified the low voltage alarm has been factory adjusted to 47.1 VDC. Refer to Figure 4-1 for detailed location of LVA potentiometer R54.

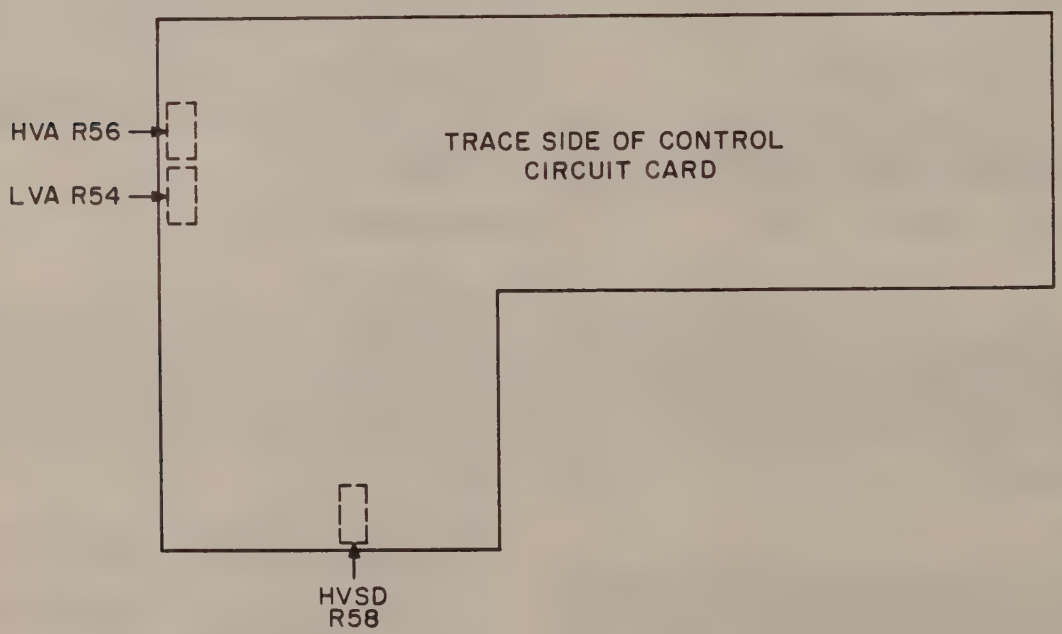

Figure 4-1
Potentiometer Locations

DANGER

Exercise extreme caution when performing this procedure. Battery voltage is present at the DC output terminals.

a) Turn the rectifier off by operating the AC INPUT circuit breaker to the OFF position.

b) Place the output circuit breaker CB2 to the OFF position.

c) Connect digital multimeter, adjusted to measure 75 VDC, to the test jacks TP1 and TP2 on front panel.

d) Place AC input circuit breaker to the ON position.

e) Adjust the LOW VOLTAGE ALARM potentiometer R54 fully clockwise.

f) Operate the FLOAT/EQ switch to the FLOAT position and note the FLOAT voltage.

g) Adjust the output voltage by means of the FLOAT potentiometer R24 to the value at which low voltage alarm is desired.

h) Slowly adjust LVA potentiometer R54 counterclockwise until the (LVA) Low Voltage Alarm LED illuminates.

i) As a check, increase the rectifier output voltage until the LVA LED extinguishes. Slowly decrease the output voltage using the FLOAT potentiometer R24 until the LVA LED illuminates. Note the voltage reading on the multimeter. Repeat Steps e) through i) if necessary until the LVA indicator illuminates at the desired voltage.

j) Reset the float output voltage. The rectifier may now be returned to service.

High Voltage Alarm Adjustment

4.08 The high voltage alarm adjustment potentiometer R56, located on control card A4, sets the value at which the HVA High Voltage Alarm LED illuminates to indicate a High Voltage condition at the output of the rectifier. Refer to Figure 4-1 for detailed location of the HVA potentiometer R56.

DANGER

Exercise extreme caution when performing this procedure. Battery voltage is present at the DC output terminals.

a) Turn the rectifier off by operating the AC INPUT circuit breaker to the OFF position.

b) Place the output circuit breaker CB2 to the OFF position.

c) Connect a digital multimeter, adjusted to measure 75 VDC, to the test jacks TP1 and TP2 on front panel.

d) Place AC input circuit breaker to the ON position.

e) Adjust High Voltage Alarm potentiometer R56 fully clockwise.

f) Operate the FLOAT/EQ switch to the EQ position and note the equalize voltage.

g) Adjust the output voltage by means of EQ potentiometer R22 to the value at which high voltage alarm is desired.

h) Slowly adjust the HIGH VOLTAGE ALARM potentiometer R56 counterclockwise until the High Voltage Alarm (HVA) LED illuminates.

i) As a check, decrease rectifier output voltage. Slowly increase the output voltage until the High Voltage Alarm (HVA) LED indicator illuminates. Repeat Steps e) through i), if necessary, until the HVA LED indicator illuminates at the desired voltage.

j) Reset the equalize output voltage, then return the rectifier to float operation. The rectifier may now be returned to service.

High Voltage Shutdown Adjustment

4.09 High Voltage Shutdown Adjustment potentiometer R58 located on Control Printed Circuit Card A4, sets the value of output voltage beyond which the rectifier AC input circuit breaker CB1 trips. The HVA LED extinguishes when AC input circuit breaker CB1 trips. An external RFA alarm will also be activated, if connected. Unless otherwise specified, the high voltage shutdown point has been factory adjusted to 59.0 VDC.

To adjust this limit, observe the following procedure. Refer to Figure 4-1 for detailed location of the HVSD potentiometer R58.

DANGER

Exercise extreme caution when performing this procedure. Battery voltage is present at the DC output terminals.

a) Turn the rectifier off by operating the AC INPUT circuit breaker to the OFF position.

b) Place the output circuit breaker CB2 to the OFF position.

c) Connect a digital multimeter, adjusted to measure 75 VDC, to the test jacks TP1 and TP2 on the front panel.

d) Place AC input circuit breaker to the ON position.

e) Adjust High Voltage Shutdown potentiometer R58 fully clockwise.

f) Operate the FLOAT/EQ switch to the EQ position and note the equalize voltage.

g) Adjust the output voltage by means of EQ potentiometer R24 to the value at which high voltage shutdown is desired.

h) Slowly adjust the potentiometer R58 counter-clockwise until the input circuit breaker CB1 trips and light emitting diode RFA illuminates.

i) As a check, decrease rectifier output voltage, and place the AC Input circuit breaker to the ON position. The rectifier should restart. Slowly increase the output voltage until the AC input circuit breaker trips and the RFA indicator illuminates. Repeat Steps e) through i), if necessary, until the AC Input circuit breaker trips at the desired voltage.

j) Reset the equalize output voltage, then return the rectifier to float operation. The rectifier may now be returned to service.

5. MODEL DATA

5.01 Refer to the Power Data Sheet for information concerning the input and output ratings, operating limits, dimensions, recommended input and output lead sizes, fusing and terminal lug capacity.

APPENDIX

RECORD OF INSTRUCTION CHANGES		
ISSUE OR DATE	ECN	DESCRIPTION OF CHANGE
A1	-	NEW
B1	-	Para2.11 corrected.
C1	-	Spec. No. 5411-058-00 added.
D1	183-9921	Circuit Card Designations changed.

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TEL. 576-82-77/TLX./01774308 (1774308 LORME)

RELIANCE
COMM/ TEC

1. SPECIFICATION

1.1 GENERAL: This FLOTROL® Rectifier is designed to power a load while charging a positive grounded battery

1.2 OUTPUT RATING:

1.2.1 Voltage: This rectifier provides voltage for floating or equalizing 23 or 24 cells of battery. Float or equalize mode of operation is selected by a switch located on the front of the rectifier.

(A) Float Voltage: Adjustable from 48.0 to 55.2 volts DC. Factory set at 52.08 volts.

(B) Equalize Voltage: Adjustable from 50.0 to 58.0 volts DC. Factory set at 54.0 volts.

1.2.2 Current: 25 amperes at full load.

1.2.3 Regulation: Steady state output voltage remains within ± 0.5% of any voltage within the range of 48.0 to 54 0 volts for any load current from no load to full load and for any input voltage and frequency specified below. Refer to Paragraph 1.8.1.

1.2.4 Filtering:

(A) For all conditions of input voltage and output load, output noise is less than 22 dBrn with C-message weighting at battery provided battery is four times the rated output current of the rectifier. Output ripples does not exceed 250 millivolts peak to peak, 30 mv rms.

(B) When this rectifier is used as an eliminator (without battery), output noise is less than 32 dBrn when measured at the rectifier output terminals with a noise meter using 600 ohm bridged input and C-message weighting.

1.3 INPUT RATINGS

1.3.1 Voltage: Taps are provided for nominal 120/208/240 volts, single phase 60 Hz with voltage ranges of 95 to 127 and 184 to 254 volts, and frequency range of 47 to 63 Hz.

ISSUE	CHG NO	DESCRIPTION
F1	—	SEP 7 1990 Paragraphs 1.1, 1.5.6 revised; Paragraph 1.5.7 added; Paragraphs 1.5.4, 1.5.5 removed; subsequent paragraphs renumbered. Paragraph 1.4.12 corrected.

LP728-2/82 REVISION

LORAIN PRODUCTS
LORAIN, OHIO
RELIANCE COMM / TEC

POWER DATA

LORAIN® MODEL A25F50
FLOTROL® RECTIFIER
SPEC. NO. 5411-055-00

DR BY	DATE	GRP LDR	DATE
R. Lush	5-9-86	A. Wehmsn	6-25-86
CH BY M. Pawlowski	DATE 5-21-86	APP BY D. Dembinski	DATE 5-21-86
ENGR BY R. Kutel	DATE 6-25-86		

PD 5411-055-00

1. SPECIFICATION

1.3 INPUT RATINGS (CONT'D)

1.3.2 Typical Input Data

(A) Rectifier initially adjusted to 52.08 volt output at 50% output load.

Nominal Input Voltage	Percent of Load	Amperes	VA	Watts	VAR	Efficiency %
120 volts	0	0.2	22	11	19	–
	25	5.2	624	375	499	86.8
	50	9.5	1138	739	865	88.1
	75	13.3	1594	1091	1162	89.5
	100	17 0	2044	1449	1442	89.9
208 volts	0	0.1	22.5	11	–	–
	25	3.5	739	371	639	87.6
	50	6.5	1349	733	1132	88.6
	75	9.2	1905	1083	1567	90
	100	11.9	2475	1444	2010	90
240 volts	0	0.1	21.2	11	–	–
	25	2.9	694	377	583	86.2
	50	5.3	1277	746	1036	87.1
	75	7.5	1796	1100	1420	88.5
	100	9.6	2304	1461	1781	89

(B) Maximum input current at 55.2 volts DC.

Tap	Input Voltage	Input Current (Amperes)
120 Volt Tap	95 Volts	21 Amp
208/240 Volt Tap	184 Volts	14.3 Amp

1.4 STANDARD FEATURES

1.4.1 **Input Protection:** A two pole circuit breaker opens one side of 120 volt service and both sides of 208/240 volt service.

1.4.2 **Output Protection:**

(A) **Current Limiting:** A nonadjustable current limit circuit with a range of 100% to 115% of full rated load, limits DC output current.

(B) **Short Circuit:** A 30 ampere circuit breaker is located in the negative output lead.

(C) **Selective Overvoltage Shutdown:** A circuit is provided to shutdown the rectifier should its output voltage exceed a preset value. If several rectifiers are operated in parallel, only the rectifier with the overvoltage condition will shutdown. Refer to Table 1 for rectifier shutdown range and values.

1. SPECIFICATION

1.4 STANDARD FEATURES (CONT'D)

LOW VOLTAGE ALARM		HIGH VOLTAGE ALARM		HIGH VOLTAGE SHUTDOWN	
Range	Factory Setting	Range	Factory Setting	Range	Factory Setting
39.1 - 52.8 VDC	47.1 VDC	52.8 - 60.0 VDC	57.6 VDC	52.8 - 60.0 VDC	59.0 VDC

TABLE 1

1.4.3 **Status and Alarm Indicators:** Contacts of the alarm relay are rated 30 volts DC at 2 ampere or 60 volts DC at 1/2 ampere.

(A) **POWER ON Indicator:** This green light emitting diode illuminates when power is applied through input circuit breaker

(B) **HVA Alarm Indicator:** This red light emitting diode illuminates when rectifier output voltage has exceeded the preset high voltage point. This alarm condition will also enable the rectifier fail alarm circuits. Refer to Table 1 for HVA adjustment range and factory set value.

(C) **LVA Alarm Indicator:** This red light emitting diode illuminates when rectifier output voltage drops below a preset low voltage point. This alarm condition will also enable the rectifier fail alarm circuits. Refer to Table 1 for LVA adjustment range and factory set value.

(D) **RFA Alarm Indicator:** This red light emitting diode illuminates when a failure disables the rectifier. In addition to the RFA indicator illuminating, a rectifier failure alarm opens one alarm circuit and close one alarm circuit. The open and closed alarm circuit is provided for connection of external alarms, if desired. The failure conditions which activate the rectifier fail alarm include:

1) Failure of AC input voltage, or manual or automatic opening of AC INPUT circuit breaker CB1.
2) Low output voltage alarm.
3) High voltage shutdown.
4) Manual or automatic opening of output breaker.
5) Low output current condition caused by a rectifier failure.
6) Any condition where the rectifier is incapable of delivering power.
7) High output voltage alarm.
8) Opening of control fuses F1 and F2.

(E) **EQ Indicator:** This yellow light emitting diode illuminates when the rectifier is supplying equalize charge voltage.

1.4.4 **Rectifier Low Current Test Feature:** Periodically, when operating at no load, the rectifier automatically checks output current capability by momentarily increasing rectifier output voltage. If the rectifier is not capable of delivering output current during the test cycle, the rectifier fail alarm circuits are activated.

1.4.5 **Remote Equalize:** Float/equalize charge operation can be controlled from a remote location.

1.4.6 **Paralleling:** This rectifier can be connected in parallel with other Model A25F50 Rectifiers.

1.4.7 **Load Sharing:** Programmed Slope Control.

1.4.8 **Current Walk-In:** Output current gradually increases as needed after the rectifier is turned on.

1. SPECIFICATION

1.4 STANDARD FEATURES (CONT'D)

1.4.9 Emergency Restoration: This rectifier can be started when connected to a fully discharged battery.

1.4.10 Meters: This rectifier is equipped with a 3-1/2 inch rectangular ammeter, ± 2% accuracy at full scale, with a range from 0-50 amperes.

1.4.11 Meter Test Points: Insulated test points, connected across the DC output and located on the front door, are provided as a convenient method of connecting an external high impedance DC voltmeter.

1.4.12 Mounting: This rectifier is designed with reversible mounting angles to permit mounting in a 19 inch or 23 inch wide relay rack with 1 inch or 1-3/4 inch multiple drilling.

1.5 ENVIRONMENTAL RATINGS

1.5.1 Operating Ambient Temperature Range: 0°C to 50°C (+ 32°F to + 122°F)

1.5.2 Storage Temperature Range: -40°C to + 85°C (-40°F to + 185°F)

1.5.3 Humidity: This rectifier is capable of operating in an ambient relative humidity range of 0 to 95%, noncondensing.

1.5.4 Altitude: This rectifier is capable of operating at altitudes from sea level to 10,000 feet at an ambient temperature of + 50°C to + 40°C, respectively.

1.5.5 Heat Dissipation: Refer to Table 2.

Btu/Hr	Input Voltage	Output Voltage	Load
502	120 VAC	52.08 VDC	25A
503	208 VAC		
543	240 VAC		

TABLE 2

1.5.6 EMI Suppression: This unit conforms to the requirements of FCC rules Part 15, Subpart B, for Class A computing devices.

1.5.7 Safety Compliance: This unit is UL listed to the requirements of UL power supply Standard 1012 for use as a power supply in electronic data processing equipment or telephone equipment in a controlled environment.

1.5.8 Ventilation Requirements

(A) Ventilation: The rectifier should be mounted so ventilating openings are not blocked and temperature of the air entering the cabinet does not exceed + 50°C (+ 122°F).

(B) Stacking of Rectifiers: When grouping two or more Model A25F50 rectifiers together in a relay rack, a 3-1/2 inch baffle plate is required above the pair of rectifiers, separating the rectifiers from additional Model A25F50 rectifiers or other heat producing equipment. A maximum of four rectifiers can be stacked together. Refer to Paragraph 1.8.1.

1. SPECIFICATION

1.5 ENVIRONMENTAL RATINGS (CONT'D)

1.5.9 **Audible Noise:** The audible noise at any point 5 feet from any vertical surface of the rectifier does not exceed 50 dB "A" weighting when measured with a General Radio 1551-C sound Level Meter (or equivalent) conforming to ANSI S1.4. Refer to Paragraph 1.8.1.

1.6 ACCESSORIES.

1.6.1 **Baffle Plates.**

A) For 19 inch relay rack mounting, 3-1/2 inch rack space: Part No. 3777-614-00 baffle.
B) For 23 inch relay rack mounting, 3-1/2 inch rack space: Part No. 3777-615-00 baffle.

1.6.2 **Low Voltage Disconnect Panels:** Requires 3-1/2 inches of rack space and is rated for 50 amperes.

1) 19 inch mounting: Part No. 4377-113-00.
2) 23 inch mounting: Part No. 4377-118-00.

1.7 RELATED DOCUMENTATION.

1.7.1 **Schematic Diagram:** SD-5411-055-00

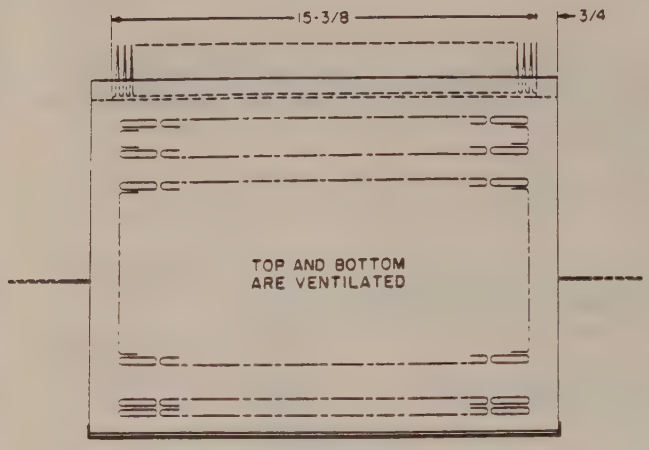
1.7.2 **Wiring Diagram** T-5411-055-00

1.7.3 **Instructions** Section 4694

1.8 SPECIFICATION NOTES

1.8.1 This parameter is guaranteed by Engineering Design. This parameter is not production tested.

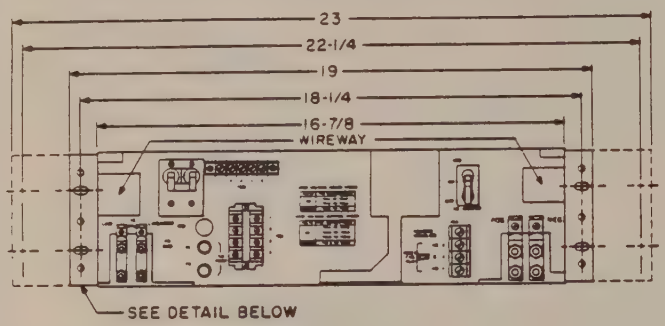
2. DIMENSIONS



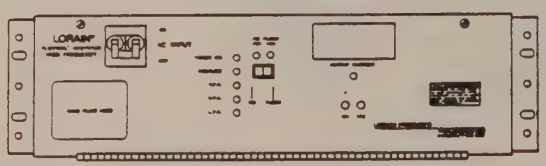
TOP VIEW

NOTES:

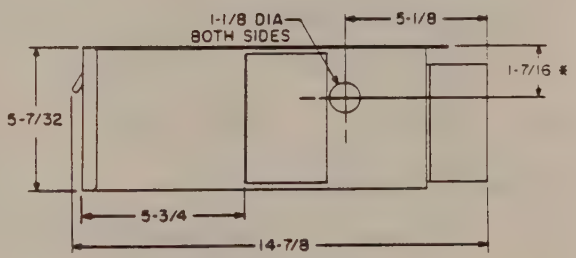
1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
2. WEIGHT IN LBS.
   NET: 39
   SHIPPING: 42
3. FINISH: EQUIPMENT LIGHT GRAY.
4. INDICATES VENTILATING GRILLE



FRONT PANEL OPEN



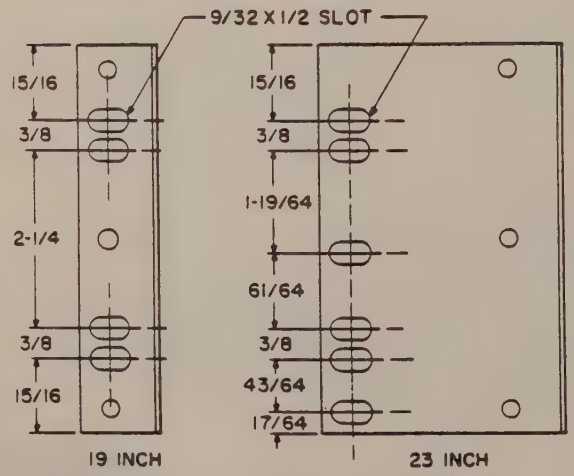
FRONT PANEL CLOSED



R. SIDE VIEW

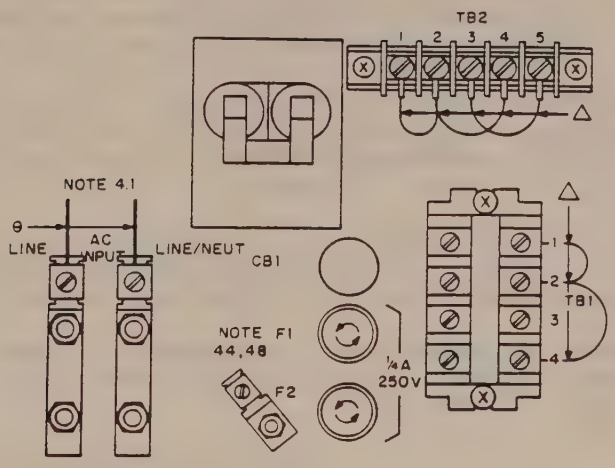
‡ 1-7/16 THIS SIDE
1-5/8 FAR SIDE

FRONT VIEW

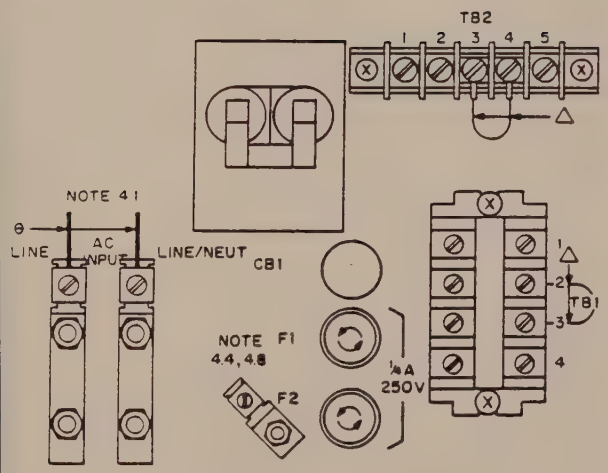


MOUNTING ANGLE DETAIL

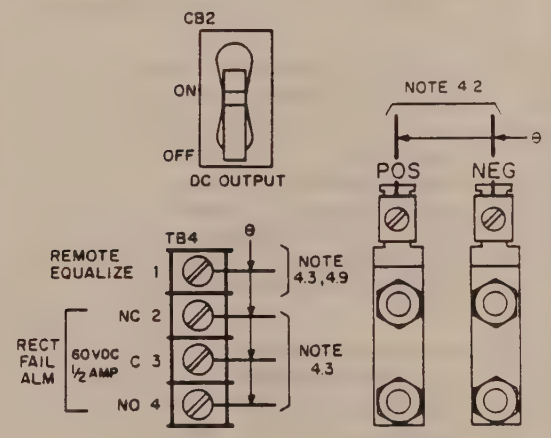
3. INSTALLER'S CONNECTIONS



120 VAC INPUT



208/240 VAC INPUT



4. INSTALLER'S INFORMATION NOTES

4.1

AC INPUT				
Terminals			Recm Wire Size (Note 4.6)	Recm Fusing
Voltage	Capacity	Type		
120	Neut 14 Ga. - 8 Ga.	Tubular, Screw Contact	10 Ga.	25 Amp
208/240	Line 14 Ga. - 8 Ga.		12 Ga.	15 Amp

4.2

DC OUTPUT			
Terminals		Loop Length (ft) (Note 4.5)	Recm Wire Size (Note 4.6)
Capacity	Type		
(+) Term 8-2 Ga.	Screw Contact	47	8 Ga.
		75	6 Ga.
(−) Term 8-2 Ga.		119	4 Ga.

4.3

ALARM AND CONTROL (TB5)		
Terminals		Recm Wire Size
Capacity	Type	
16 Ga.	6-32 Screw	18 Ga.

4.4

EARTH GROUND		
Terminals		Recm Wire Size (Note 4.10)
Capacity	Type	
6-14 Ga.	Screw Contact	8 Ga.

4. INSTALLER'S INFORMATION NOTES

4.5 DC output wire size sufficient to restrict voltage drop to one volt or less at rated full load output current for the loop lengths shown. The loop length is the sum of the lengths of the positive and negative leads.

4.6 Wire sizes based on recommendations of the National Electrical Code Table 310-16 for copper wire at 75°C conductor temperature, operating in ambient of 30°C. For operation in ambient higher than 30°C, apply derating factors listed in Table 310-16 of the National Electrical Code.

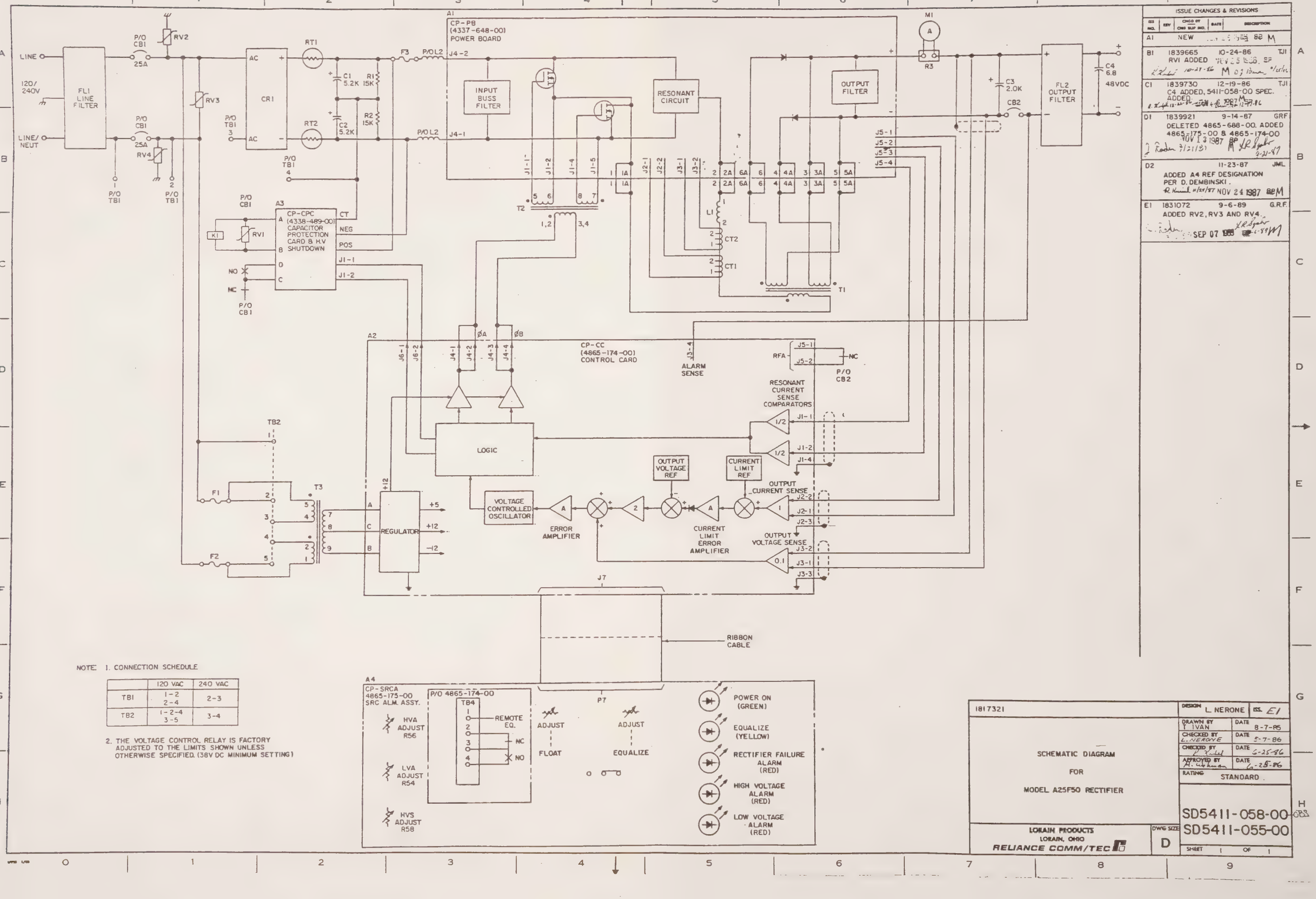
4.7 If a failure disables the rectifier, closed circuits between terminal board TB4 terminals 2 to 3 and open circuits are provided between terminal board TB4 terminals 3 to 4. If ground (positive battery) actuated external alarms are required, connect a customer furnished jumper from (+ battery) to terminal board TB4 terminal 3.

4.8 Connect this wire to earth ground (green wire). Equipment grounding conductor size based on recommendations of National Electric Code Table 250-95 for copper wire. If aluminum or copper clad aluminum grounding conductor is used refer to Table 250-95 for increased conductor size.

4.9 Remove Equalize: Customer furnished positive ground applied to this terminal places the rectifier into equalize charge operation. When utilizing remote equalize, the FLOAT/EQ rocker switch must be in the FLOAT position.

4.10 θ - indicates leads furnished and run by the installer.

4.11 Δ - indicates leads furnished with the rectifier and connected by the installer.



NOTE: 1. CONNECTION SCHEDULE

	120 VAC	240 VAC
TB1	1-2 2-4	2-3
TB2	1-2-4 3-5	3-4

2. THE VOLTAGE CONTROL RELAY IS FACTORY ADJUSTED TO THE LIMITS SHOWN UNLESS OTHERWISE SPECIFIED. (38V DC MINIMUM SETTING)

ISSUE CHANGES & REVISIONS

ISS NO.	ESV	CHGD BY CNG SLIP NO.	DATE	DESCRIPTION
A1				NEW
B1	1839665		10-24-86	TJI RV1 ADDED
C1	1839730		12-19-86	TJI C4 ADDED, 5411-058-00 SPEC. ADDED
D1	1839921		9-14-87	GRF DELETED 4865-688-00. ADDED 4865-175-00 & 4865-174-00
D2			11-23-87	JML ADDED A4 REF DESIGNATION PER D. DEMBINSKI.
E1	1831072		9-6-89	G.R.F. ADDED RV2, RV3 AND RV4.

1817321	DESIGN L. NERONE	ESS E1	
SCHEMATIC DIAGRAM FOR MODEL A25F50 RECTIFIER	DRAWN BY T. IVAN	DATE 8-7-85	
	CHECKED BY L. NERONE	DATE 5-7-86	
	CHECKED BY	DATE 6-25-86	
	APPROVED BY A. Wehman	DATE 6-28-86	
	RATING STANDARD		
LORAIN PRODUCTS LORAIN, OHIO RELIANCE COMM/TEC	DWG SIZE D	SD5411-058-00 SD5411-055-00	SHEET 1 OF 1

SD-DRAWING ISSUES AND T-DRAWING ISSUES AS FOLLOWS:

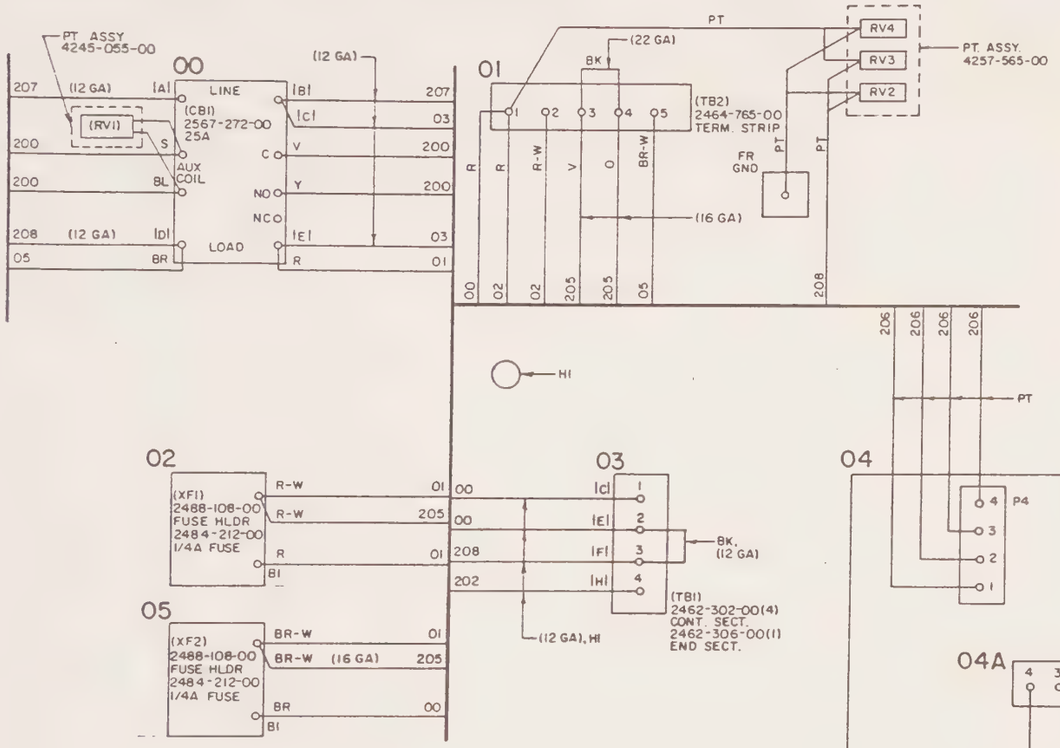
SD-DRAWING ISSUES

A1	A1	B1	C1	D1	E1																		

T-DRAWING ISSUES

A1	B1	C1	D1	E1	F1																		

FIG. 1
(FRONT)



MANUFACTURING NOTES:

1. ALL WIRING TO BE 20 GA, UNLESS OTHERWISE SPECIFIED.
2. ALL WIRES ARE JUMPERS.
3. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS.
4. PT-LEADS WHICH ARE PART OF COMPONENT OR SUBASSEMBLIES.
5. |a|, |b|, ETC - INDICATES WIRE LABELS.
6. UNIT IS FACTORY WIRED FOR 208/240 VOLTAGE.
7. HI - WIRES RUN THROUGH CORRESPONDINGLY DESIGNATED HOLES.
8. ⬭ - INDICATES SHIELDED PAIR.
9. B1 - INDICATES TERMINAL NEAREST MOUNTING SURFACE.
10. 2 TW - TWO WIRES SHALL BE TWISTED TOGETHER.

PIGTAIL COMPONENT INFORMATION

REF DESIG	LORAIN PART NO.	VALUE	LOC
RV1	2676-341-00		00
RV2-4	2676-355-00		01

ISSUE CHANGES & REVISIONS

ISS NO.	REV	CHGD BY / CHG SLIP NO.	DATE	DESCRIPTION
A1				NEW
B1		1839532	8-1-86	J.R. B1 CHGD AT LOC. 209A. AUG 19 1986 8/7/86 Dan Rake 8-7-86 A. MARCUCCI
C1		1839665	10-27-86	J.R. RV1 ADDED TO SHEETS 1 & 3 10/28/86 Dan Rake 10-28-86 A. MARCUCCI
D1		1839730	12-20-86	TJI C4 ADDED TO SHTS 2 & 3, SPEC. 5411-058-00 ADDED. Dan Rake 12-22-86 A. Marcucci 12-22-86
E1		1839921	9-15-87	G.R.F. CHANGED A2 PW PT. NO. TO 4865-174-00. ADDED (A4) 4865-175-00 TO DOOR. 9-16-87 A. MARCUCCI 9-16-87
F1		1831072	9-5-89	G.R.F. ADDED PIGTAIL ASSY. 4257-565-00 AT LOC. 101 AND 208. D. Lima 9-6-89 SEP 07 1989 J. Reese 9/6/89

181-7321

WIRING DIAGRAM
FOR
MODEL A25F50

DESIGN	D. RAKE	ISS. F1
DRAWN BY	J. REESE	DATE 2-11-86
CHECKED BY	Dan Rake	DATE 6-24-86
CHECKED BY	R. Tekel	DATE 6-24-86
APPROVED BY		DATE
RATING		

T-5411-058-00 ISS. H
T-5411-055-00

LORAIN PRODUCTS
LORAIN, OHIO
RELIANCE COMM/TEC

DWG SIZE D

SHEET 1 OF 3

FIG. 2
BASE

FIG. 3
REAR

PIGTAIL COMPONENT INFORMATION			
REF DESIG	LORAIN PART NO	VALUE	LOC
R1, 2	2652-563-00	15K	02,01
RT1, 2	2676-184-00	0.5	02,01
C4	2724-695-00	6.8	09

A1	M J.R.
B1	M J.R.
C1	M J.R.
D1	M TJ1
E1	M G.R.F.
F1	M G.R.F.

ISSUE F1

MODEL A25F50

T-5411-058-00
T-5411-055-00

LORAIN PRODUCTS

DWG SIZE D

SHEET 2

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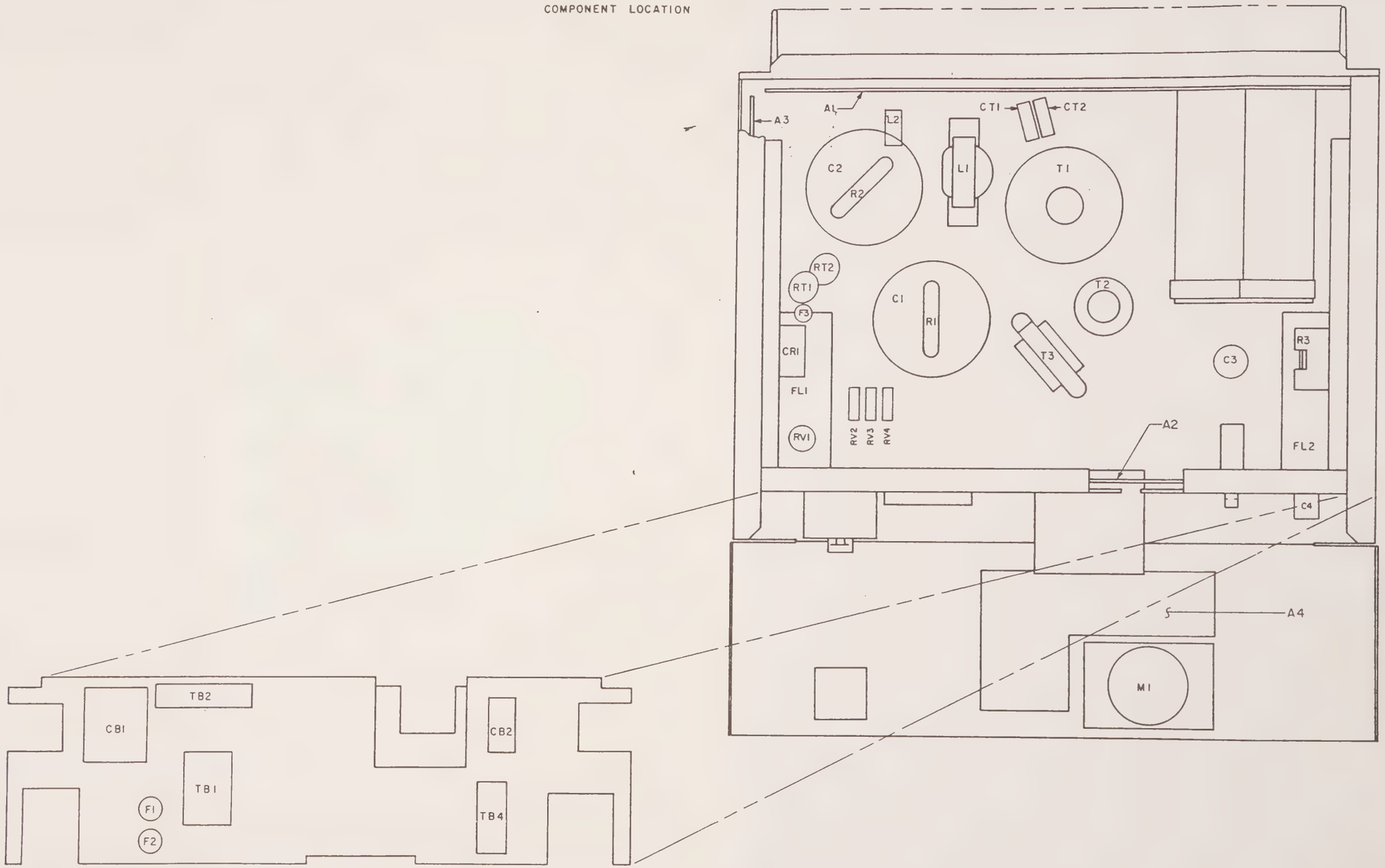
FIG. 4

COMPONENT LOCATION



A1	M	
B1	M	J.R.
C1	M	J.R.
D1	M	TJ1
E1	M	G.R.F.
F1	M	G.R.F.

ISSUE F1

MODEL A25F50

T-5411-058-00
T-5411-055-00

LORAIN PRODUCTS

DRWG SIZE D

SHEET 3 OF 3

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Windsor, Connecticut 06095
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FAX: 203/298-8996

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FAX: 303/421-9310

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Columbia, Maryland 21046
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FAX: 301/498-0809

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Telephone: 415/226-1163
FAX: 415/226-9460

TEXAS REGIONAL SERVICE CENTER
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Grand Prairie, Texas 75050
Telephone: 214/660-5986
FAX: 214/660-7381

NORTHERN CALIFORNIA REGIONAL SERVICE CENTER
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Fremont, California 94538
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FAX: 415/226-9460

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Telephone: 519/631-0780
FAX: 519/631-0359

FLORIDA SERVICE CENTER
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Apopka, Florida 32703
Telephone: 407/886-0160
FAX: 407/886-4547

MICHIGAN SERVICE CENTER
Bath, Michigan
Telephone: 216/288-1122
FAX: 216/288-1141

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- ☐ Product Revision Upgrades
- ☐ Y1, Y2 Load Simulators
- ☐ Software/Hardware Maintenance
- ☐ Annual Maintenance Contracts
- ☐ Power Evaluation Programs (PEP)
- ☐ PowerTherm SM Thermographic Analysis
- ☐ _____
- ☐ _____

COMMENTS: _____
_____
_____

Name & Title: _____
Tel. Co. Name: _____
Address: _____
City: _____ State: _____ Zip: _____ Ph.# _____

Mail to your nearest LORAIN Regional Service Center

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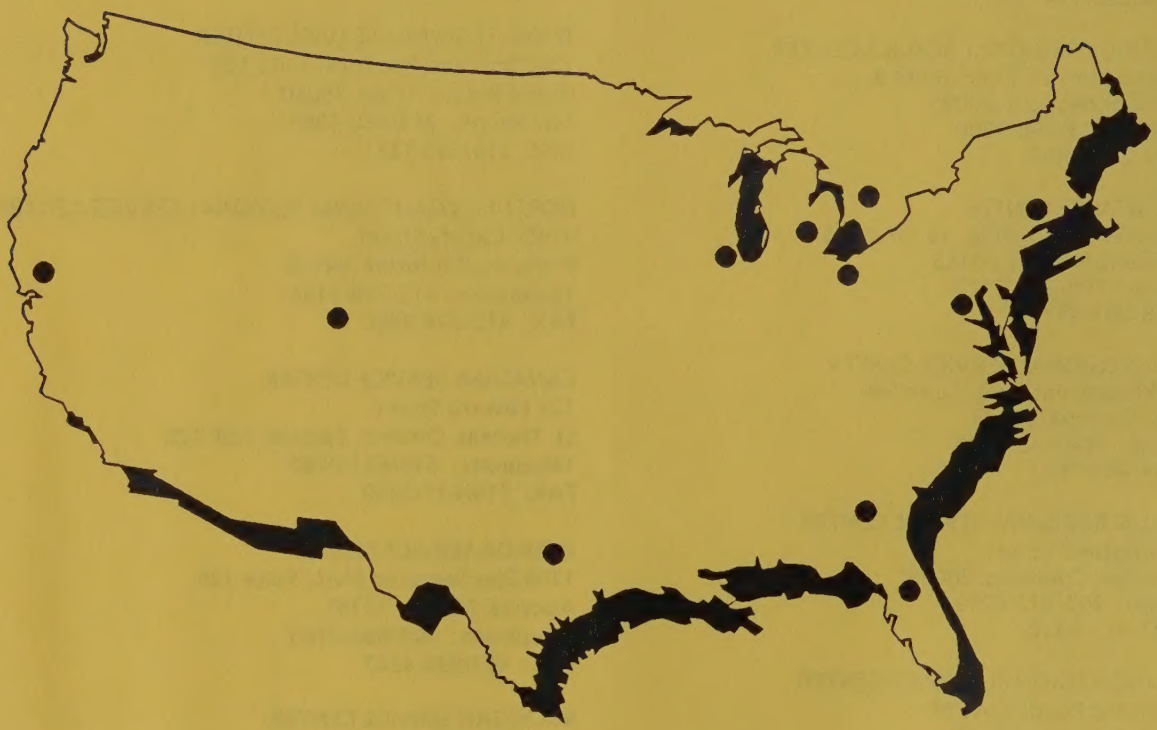

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  - Infrared Scanning for your Power Room
- TRAINING
  - Factory
  - Customer Site
- SPECIALIZED TEST EQUIPMENT
  - Ringing Generator Test Set- Model LS2000 (Includes loads, metering, digital frequency counter)
  - Load Simulators, Model Y1, Y2 25V, 50V, and 130V.
- POWER UPGRADE AND MODERNIZATION (E & I)
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